

WHAT IS CLAIMED IS:

1. A vial access adapter-vial assembly allowing for withdrawal of a medicinal fluid contained in the vial without inverting the vial, comprising:

- 5 (a) a vial having a medical fluid therein; and
(b) a vial access adapter body;

wherein said vial comprises:

10 a cylindrical side wall having a distal end and a proximal end, said distal end extending into a constricted neck portion terminating in a rim and defining an open fluid port, and said proximal end being closed by a flat outside bottom portion, and V-shaped inside bottom portion;

said fluid port being closed by an elastomeric stopper wherein said vial access adapter body comprises:

15 a cylindrical side wall having a distal end and a proximal end terminating in a rim;
a flat, horizontal top wall, closing the distal end of the cylindrical side wall;
an externally threaded female luer connector projecting vertically above the horizontal top wall for receiving an internally threaded male luer connector of a syringe or cartridge;

20 an elongated spike having a fluid flow channel therein, and being integral with said female luer connector, extending into said vial and reaching the V-shaped bottom portion thereof to allow withdrawal of essentially all the medical fluid from the vial when said vial is in the right-side-up position; and

a removable luer cap hermetically sealing the female luer connector.

25 2. The vial access adapter-vial assembly of claim 1 wherein said vial is of glass or a polymeric material.

3. The vial access adapter-vial assembly of claim 1 wherein said vial access adapter is made of a thermoplastic material.

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4. The vial access adapter-vial assembly of claim 1 wherein said V-shaped inside bottom portion having a side wall with an angel of more than 90° and less than 180°.

5. The vial access adapter-vial assembly of claim 4 wherein said V-shaped inside bottom portion having a side wall with an angle of more than 100° and less than 170°.

5 6. The vial access adapter-vial assembly of claim 4 wherein the inside wall of the V-shaped bottom portion terminates at the center portion of said vial.

7. A vial access adapter-vial assembly allowing withdrawal of a nuclear drug contained in the vial without inverting the vial, comprising:

- 10 (a) a vial having a nuclear drug therein; and
(b) a vial access adapter body;

wherein said vial comprises:

a cylindrical side wall having a distal end and a proximal end, said distal end extending into a constricted neck portion terminating in a rim and defining an open fluid
15 port, and said proximal end being closed by a flat outside bottom portion and a V-shaped inside bottom portion; said fluid port being closed by an elastomeric stopper;

wherein said vial access adapter body comprises:

a cylindrical wall having a distal end and a proximal end terminating in a rim;
a flat, horizontal top wall closing the distal end of the cylindrical side wall;
20 an externally threaded female luer connector projecting vertically above the horizontal top wall for receiving an internally threaded male luer connector of a syringe or cartridge;

any elongated spike having a fluid flow channel therein, and being integral with said female luer connector, extending into said vial and reaching the V-shaped bottom
25 portion thereof to allow withdrawal of essentially all the nuclear drug from the vial when said vial is in the right-side-up position;

a removable luer cap hermetically sealing the female luer connector; wherein said vial access adapter-vial assembly is enshrouded in a protective cover.

30 8. The vial access adapter-vial assembly of claim 7 wherein said vial is of glass or a polymeric material.

9. The vial access adapter-vial assembly of claim 7 wherein said vial access adapter is made of a thermoplastic material.

5 10. The vial access adapter-vial assembly of claim 7 wherein said V-shaped inside bottom portion having a side wall with an angle of more than 90° and less than 180°.

11. The vial access adapter-vial assembly of claim 10 wherein said V-shaped inside bottom portion having a side wall with an angle of from about 100° to about 170°.

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12. The vial access adapter-vial assembly of claim 10 wherein the inside wall of the V-shaped bottom portion terminates at the center portion of said vial.

13. The vial access adapter-vial assembly of claim 7 wherein said protective cover is made of lead.

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14. The vial access adapter-vial assembly of claim 7 of wherein said protective cover is made of an alloy comprising lead.

15. The vial access adapter-vial assembly of claim 7 wherein said nuclear drug is a diagnostic agent.

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16. A vial access adapter-vial assembly allowing withdrawal of a medical fluid contained in the vial without inverting the vial comprising:

- 25 (a) a vial having a medical fluid therein; and
(b) a vial access adapter body;

wherein said vial comprises:

a cylindrical side wall having a distal end and a proximal end, said distal end extending into a constricted neck portion terminating in a rim and defining an open fluid port, and said proximal end being closed by a flat outside bottom portion and a V-shaped inside bottom portion; said fluid port being closed by an elastomeric stopper;

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wherein said vial access adapter body comprises:

a cylindrical wall having a distal end and a proximal end terminating in a rim;
a flat, horizontal top wall closing the distal end of the cylindrical side wall and having vent holes therein;

5 a horizontal second wall parallel to said horizontal top wall and spaced therefrom, said horizontal top wall, second wall and cylindrical side wall enclosing a chamber designed to hold a filter therein;

an antibacterial filter contained in said chamber;

10 an externally threaded female luer connector projecting vertically above the horizontal top wall for receiving an internally threaded male luer connector of a syringe or cartridge;

any elongated spike having a fluid flow channel therein, and being integral with said female luer connector, extending into said vial and reaching the V-shaped bottom portion thereof to allow withdrawal of essentially all the medical fluid from the vial when
15 said vial is in the right-side-up position; and

a removable luer cap hermetically sealing the female luer connector.

17. The vial access adapter-vial assembly of claim 16 wherein said vial is of glass or a polymeric material.

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18. The vial access adapter-vial assembly of claim 16 wherein said vial access adapter is made of a thermoplastic material.

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19. The vial access adapter-vial assembly of claim 16 wherein said V-shaped inside bottom portion having a side wall with an angle of more than 90° and less than 180°.

20. The vial access adapter-vial assembly of claim 19 wherein said V-shaped inside bottom portion having a side wall with an angle of from about 100° to about 170°.

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21. The vial access adapter-vial assembly of claim 19 wherein the inside wall of the V-shaped bottom portion terminates at the center portion of said vial.

22. A vial access adapter-vial assembly allowing withdrawal of a nuclear drug contained in the vial without inverting the vial comprising:

- (a) a vial having a nuclear drug therein; and
- (b) a vial access adapter body;

wherein said vial comprises:

a cylindrical side wall having a distal end and a proximal end, said distal end extending into a constricted neck portion terminating in a rim and defining an open fluid port, and said proximal end being closed by a flat outside bottom portion and a V-shaped inside bottom portion; said fluid port being closed by an elastomeric stopper;

wherein said vial access adapter body comprises:

a cylindrical wall having a distal end and a proximal end terminating in a rim;

a flat, horizontal top wall closing the distal end of the cylindrical side wall and having vent holes therein:

a horizontal second wall parallel to said horizontal top wall and spaced therefrom, said horizontal top wall, second wall and cylindrical side wall enclosing a chamber designed to hold a filter therein;

an antibacterial filter contained in said chamber;

an externally threaded female luer connector projecting vertically above the horizontal top wall for receiving an internally threaded male luer connector of a syringe or cartridge;

any elongated spike having a fluid flow channel therein, and being integral with said female luer connector, extending into said vial and reaching the V-shaped bottom portion thereof to allow withdrawal of essentially all the medical fluid from the vial when said vial is in the right-side-up position; and

a removable luer cap hermetically sealing the female luer connector.

23. The vial access adapter-vial assembly of claim 22 wherein said vial is of glass or a polymeric material.

24. The vial access adapter-vial assembly of claim 22 wherein said vial access adapter is made of a thermoplastic material.

25. The vial access adapter-vial assembly of claim 22 wherein said V-shaped inside
5 bottom portion having a side wall with an angle of more than 90° and less than 180°.

26. The vial access adapter-vial assembly of claim 25 wherein said V-shaped inside bottom portion having a side wall with an angle of from about 100° to about 170°.

10 27. The vial access adapter-vial assembly of claim 25 wherein the inside wall of the V-shaped bottom portion terminates at the center portion of said vial.

28. The vial access adapter-vial assembly of claim 22 wherein said protective cover is made of lead.

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29. The vial access adapter-vial assembly of claim 22 wherein said protective cover is made of an alloy comprising lead.

30. The vial access adapter-vial assembly of claim 22 wherein said nuclear drug is a
20 diagnostic agent.